OPERATING SUMMARY

PORT DOVER

water pollution control plant

1967

ONTARIO WATER RESOURCES COMMISSION
Division of Plant Operations

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET, TORONTO 5
OFFICE OF THE GENERAL MANAGER

Members of the Port Dover Local Advisory Committee,
Port Dover, Ontario.

Gentlemen:

We are happy to present you with the 1967 Operating Summary for the Port Dover Water Pollution Control Plant, OWRC Project No. 2-0115-62. Your co-operation with our staff throughout the year has been appreciated. Only with such co-operation can the war against water pollution be waged effectively.

Yours very truly,

D. S. Caverly,
General Manager.

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET
TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN

J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to submit to you the 1967 Operating Summary for the Port Dover Water Pollution Control Plant, OWRC Project No. 2-0115-62.

The summary reviews progress during the year, outlines operating problems encountered and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

● This operating summary has been prepared in order to acquaint readers with the management of the project during 1967. The efficiency of the plant's operation is reflected in a general review. Significant financial details are recorded, and technical performance is illustrated by graphs and charts.

The summary should answer two salient questions. Are the project's facilities adequate at this time? And can the project meet future requirements?

The Regional Operations Engineer is primarily responsible for the preparation of the report, and will be pleased to answer any questions regarding it.

Most of the material for the graphs and charts was compiled by the statistics section of the Division of Plant Operations, with the final versions of the graphs being drawn by the draughting section of the Division of Sanitary Engineering. Cost data were provided by the Division of Finance.

It will be evident from the report that all of these groups co-operated with substantial success.

CONTENTS

PORT DOVER

water pollution control plant

operated for

THE TOWN OF PORT DOVER

by the

ONTARIO WATER RESOURCES COMMISSION

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DIRECTOR: D. A. McTavish

Assistant Director: C. W. Perry
Regional Supervisor: P. J. Osmond
Operations Engineer: R. E. Brown

801 Bay Street Toronto 5

'67 REVIEW

The total operating cost for the year was $22,671.63 representing a cost of $198.42 per million gallons of sewage treated. This high unit cost is expected to decrease as the flows to the plant increase.

The average sewage flow was 0.313 mgd which is approximately 15% of the design capacity of 2.1 mgd. The average raw sewage strengths for BOD and SS were 179 and 182 ppm respectively and the removal efficiencies for BOD and SS were 52.3 and 64.1% respectively.

The plant staff were effective in keeping a clean, attractive and well maintained project during 1967.

PROJECT COSTS

NET CAPITAL COST (Estimated)	$684,518.88
DEDUCT - Portion Financed by CMHC (Estimated)	463,731.87
Long Term Debt to OWRC	$220,787.01
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1967	$ 18,115.63
Net Operating	$ 22,671.63
Debt Retirement	4,453.00
Reserve	4,441.56
Interest Charged	12,421.13
TOTAL	$ 43,987.32

RESERVE ACCOUNT

Balance at January 1, 1967	$ 11,879.44
Deposited by Municipality	4,441.56
Interest Earned	772.15
	$ 17,093.15
Less Expenditures	-
Balance at December 31, 1967	$ 17,093.15

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY
JAN	1010.17	848.23					147.29	4.62	10.03
FEB	1524.12	800.79		435.53	151.99	135.81			
MARCH	3123.05	1341.65		477.33	320.78	76.73	89.62	747.13	69.81
APRIL	1878.64	889.65		441.58		61.54			485.87
MAY	1651.81	894.25		422.70	456.75	96.33	135.00	99.95	453.17
JUNE	1734.33	973.64	200.73	407.71		64.52	37.44		50.29
JULY	1479.71	888.33	8.06	333.85		136.79		55.97	56.71
AUG	2233.14	911.14	66.77	327.76	891.72	25.72			10.03
SEPT	2144.43	1427.15	66.77	329.83	(6.42)	125.84		201.26	
OCT	1405.89	882.78		327.01		131.70		44.34	20.06
NOV	2453.16	941.83		343.11	472.77	37.47			657.98
DEC	2033.18	893.90	13.44	801.67		207.53		28.80	87.84
TOTAL	22671.63	11693.34	355.77	4648.08	2287.59	1099.98	409.35	1182.07	995.45

BRACKETS INDICATE CREDIT

YEARLY OPERATING COSTS

YEAR	M. G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1965	126.92	$23,343.94	$183.93	9 CENTS
1966	127.706	23,641.32	185.12	10 CENTS
1967	114.256	22,671.63	198.42	21 CENTS

VACUUM FILTER COSTS (MONTHLY)

FILTRATION USING CONVENTIONAL CHEMICALS

MONTH	COST PER MONTH					TOTAL	COST PER TON DRY WEIGHT					TOTAL
	$FeCl_3$	CAO	LABOUR	ELEC	MAINT		$FeCl_3$	CAO	LABOUR	ELEC	MAINT	
JANUARY	48.81	8.16	31.91	2.45	11.41	103.74	20.75	3.40	13.30	1.02	4.75	43.23
FEBRUARY	64.16	8.16	26.67	2.10	9.54	110.63	31.19	3.97	12.97	1.02	4.64	53.79
MARCH	121.01	14.28	45.04	4.45	16.10	200.88	27.74	3.27	10.33	1.02	3.69	46.05
APRIL	56.85	8.16	26.67	3.17	9.54	104.39	18.30	2.63	8.59	1.02	3.07	33.61
MAY	64.16	8.16	29.30	2.70	10.48	114.80	24.25	3.08	11.07	1.02	3.96	43.38
JUNE	135.36	18.36	61.22	8.24	21.89	245.07	16.75	2.27	7.58	1.02	2.71	30.33
JULY												
AUGUST												
SEPTEMBER	28.43	2.56	15.94	1.14	5.70	53.77	25.48	2.29	14.28	1.02	5.10	48.17
OCTOBER	63.90	9.18	27.17	2.72	13.29	126.26	24.00	3.45	13.96	1.02	4.99	47.42
NOVEMBER	32.08	3.56	12.93	0.89	4.63	54.09	36.54	4.06	14.73	1.02	5.27	61.62
DECEMBER												
TOTAL	615.76	80.58	286.85	27.86	102.58	1113.63						
AVERAGE PER TON							22.55	2.95	10.50	1.02	3.76	40.78

COMMENTS

The cost of filtering raw sludge in 1967 averaged $35.20 per ton of dry solids. The cost per ton using polyelectrolyte was $23.03 and the cost per ton using conventional chemicals was $40.78. The unit cost of sludge filtration will decrease with the almost exclusive future use of polyelectrolytes and with an increase in sludge volume with increased flows. It should be noted that the polyelectrolytes, although much cheaper, have not produced a filter cake under all circumstances and lime and ferric chloride must still be used during some periods.

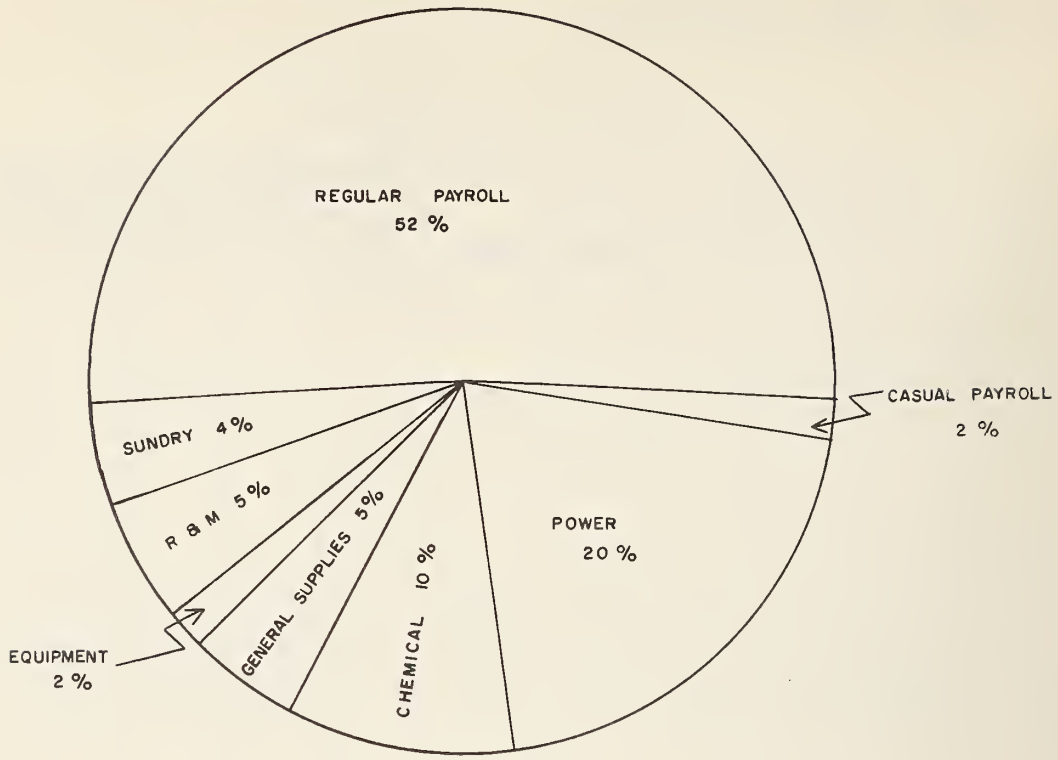
VACUUM FILTER COSTS (MONTHLY)

FILTRATION USING POLYELECTROLYTES

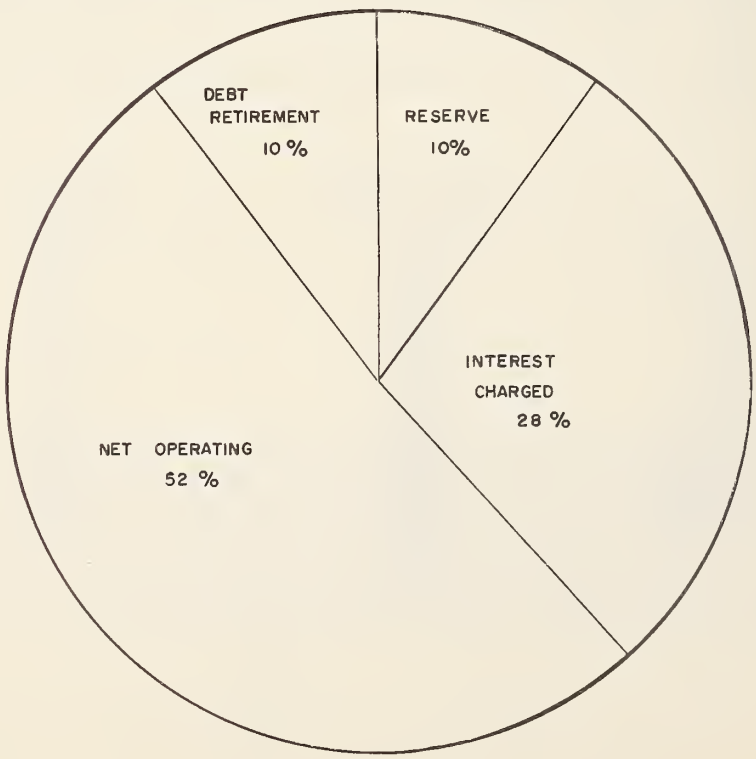
MONTH	COST PER MONTH						COST PER TON DRY WEIGHT					
	$FeCl_3$	POLY	LABOUR	ELEC	MAINT	TOTAL	$FeCl_3$	POLY	LABOUR	ELEC	MAINT	TOTAL
JANUARY												
FEBRUARY												
MARCH												
APRIL												
MAY												
JUNE												
JULY		18.71	55.53	4.64	19.85	98.73		4.12	12.22	1.02	4.37	21.73
AUGUST		14.14	37.17	3.19	13.29	67.79		4.52	11.88	1.02	4.25	21.67
SEPTEMBER		10.50	13.36	0.95	4.78	29.59		11.22	14.27	1.02	5.11	31.62
OCTOBER												
NOVEMBER		10.10	12.43	0.86	4.44	27.83		12.00	14.76	1.02	5.27	33.05
DECEMBER		18.18	31.91	3.16	11.41	64.66		5.91	10.37	1.02	3.71	21.01
TOTAL		71.36	150.40	12.80	53.77	288.60						
AVERAGE PER TON								5.72	12.00	1.02	4.29	23.03

	TOTAL MONTHLY	PER TON DSF
JANUARY	$ 103.74	$ 43.22
FEBRUARY	110.63	53.79
MARCH	200.88	46.05
APRIL	104.39	33.61
MAY	114.80	43.38
JUNE	245.07	30.33
JULY	98.73	21.73
AUGUST	67.79	21.67
SEPTEMBER	83.36	40.62
OCTOBER	126.26	47.43
NOVEMBER	81.92	47.63
DECEMBER	64.66	21.02
	$1402.23	

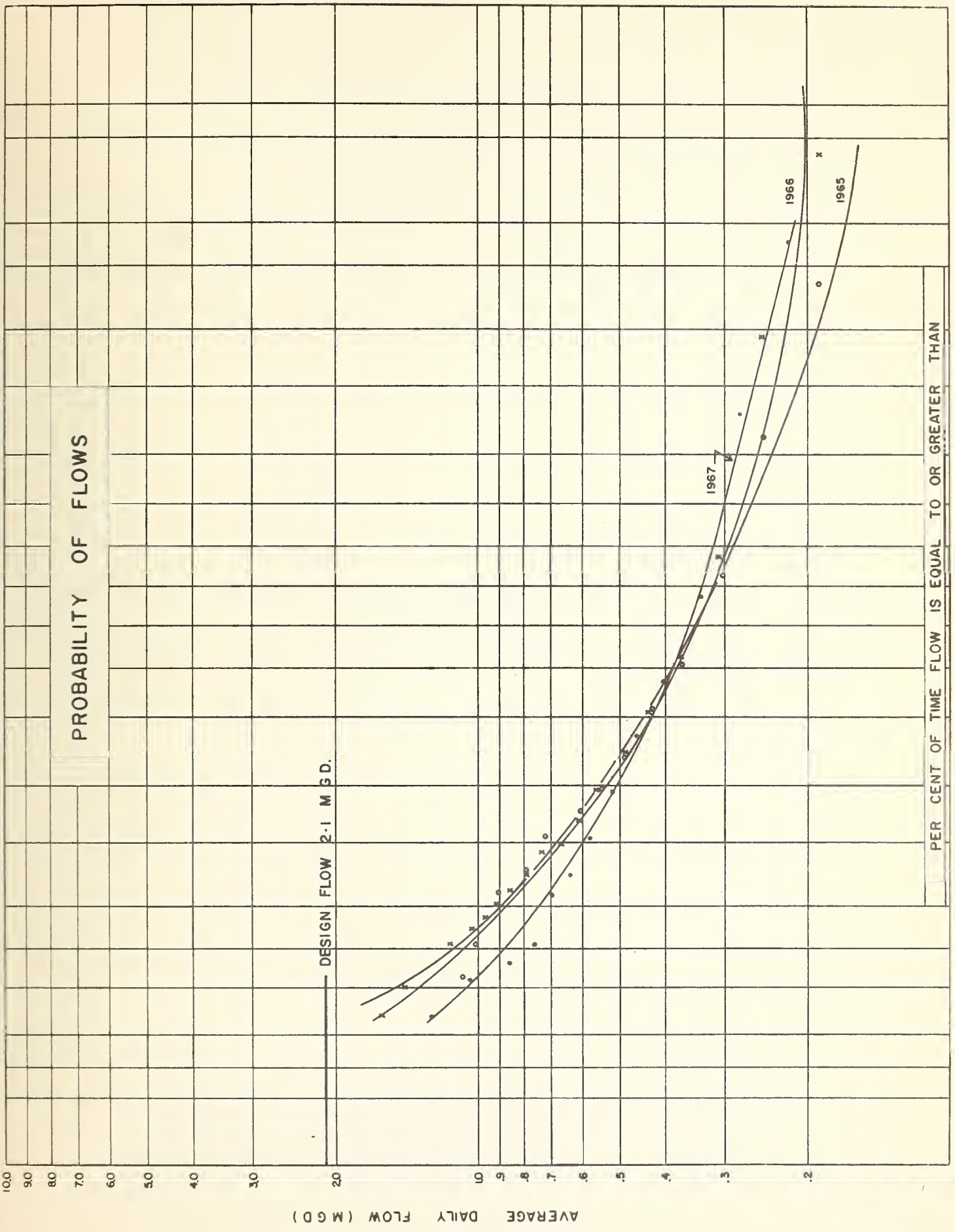
1967 OPERATING COSTS

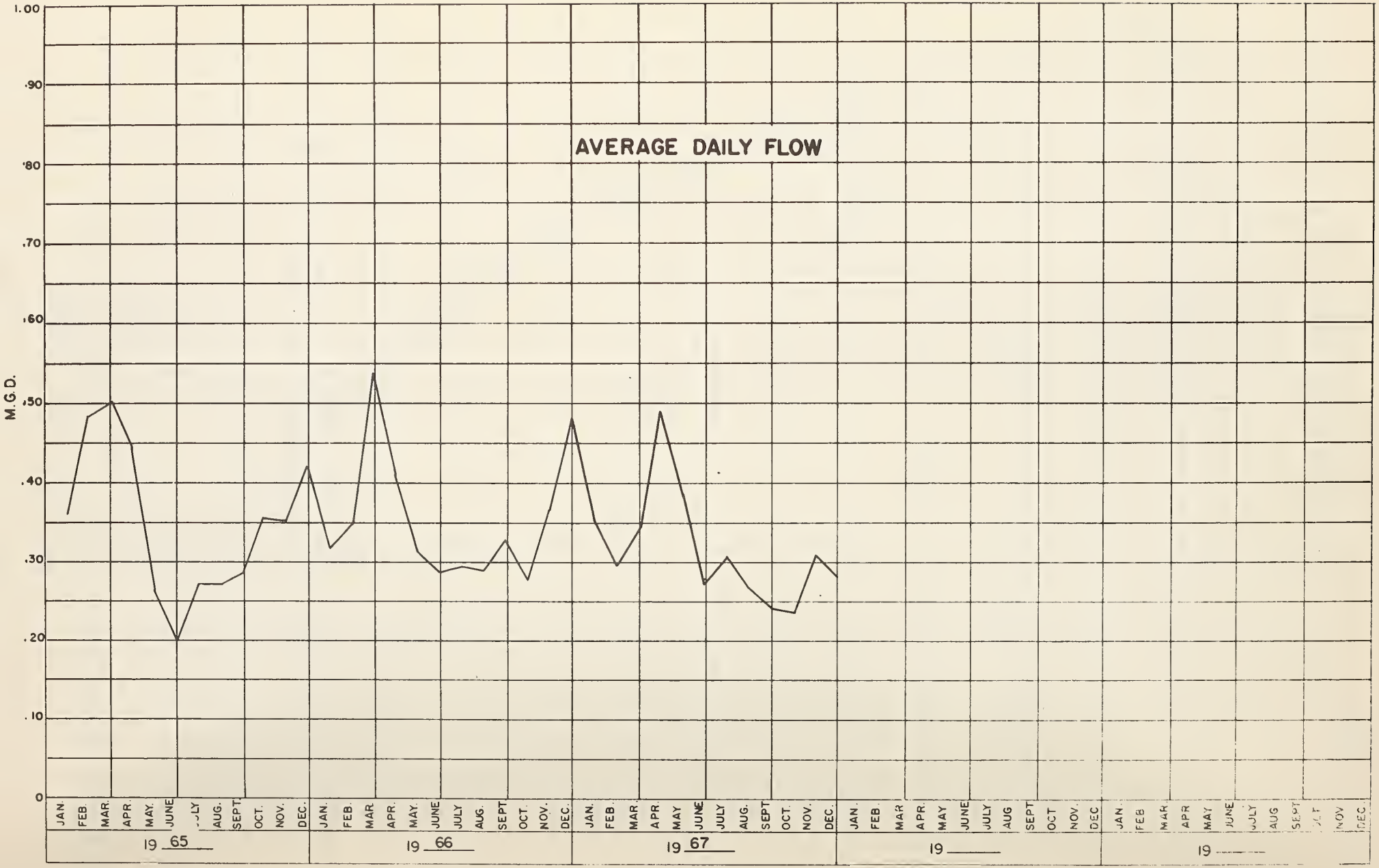


TOTAL ANNUAL COST



Process Data



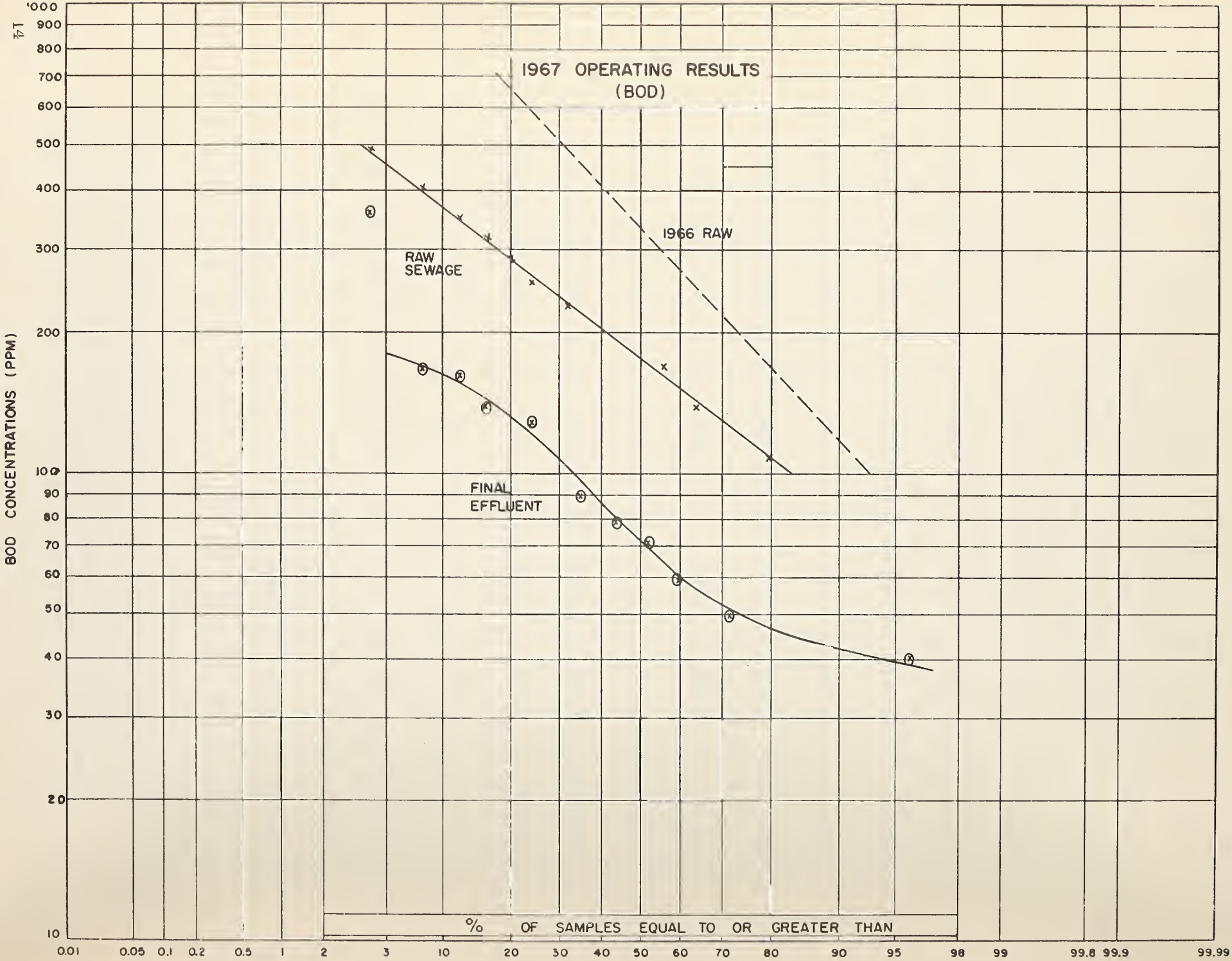

AVERAGE DAILY FLOW
M.G.D.
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
0
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 65
19 66
19 67
19

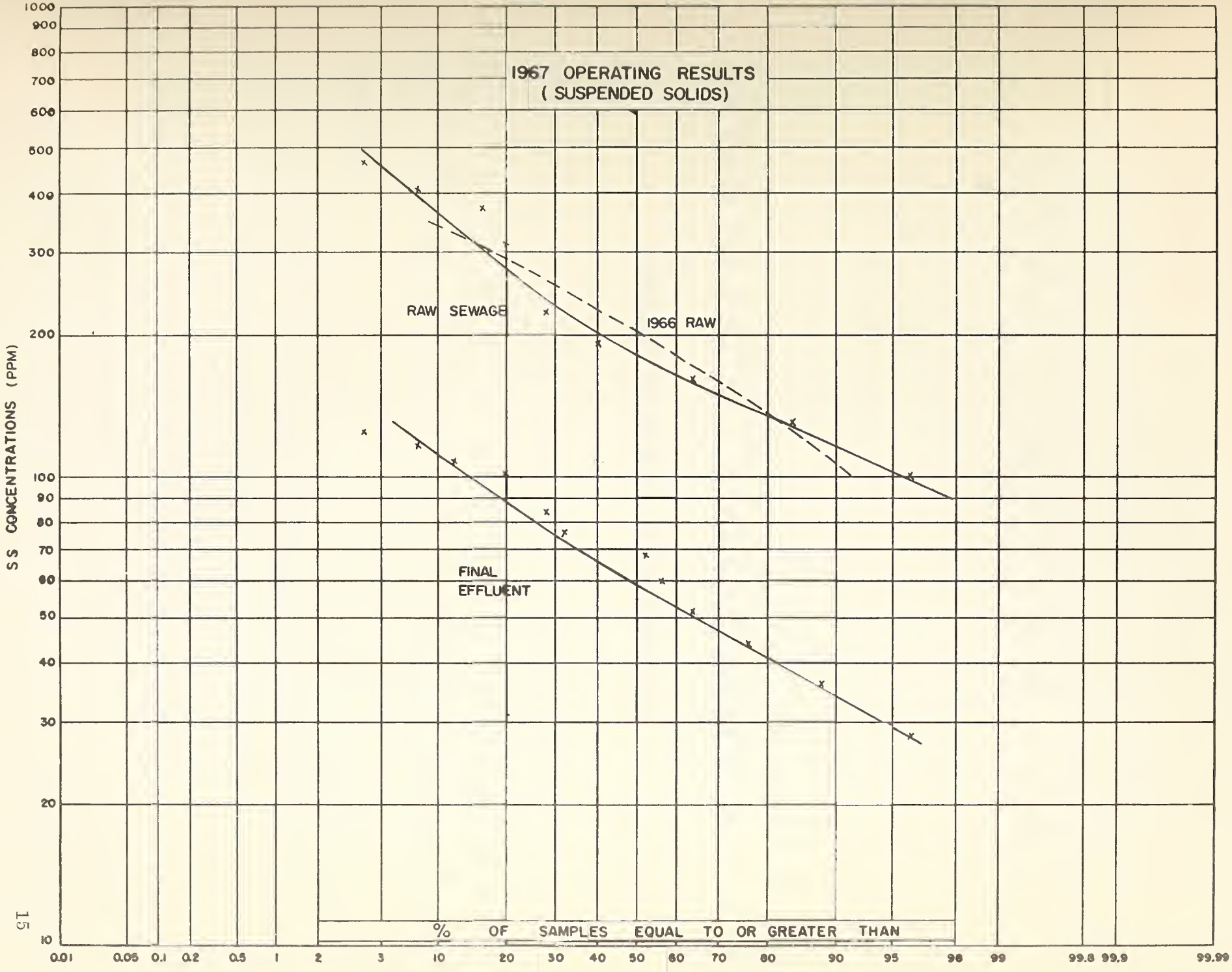
FLOW DATA

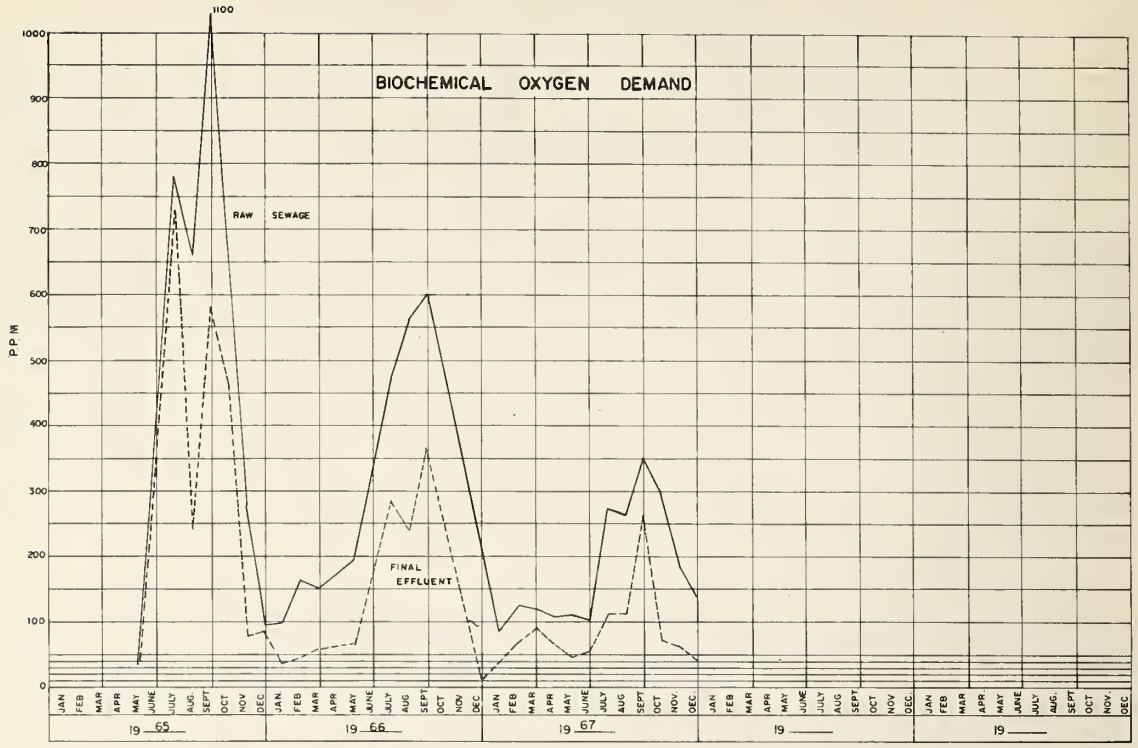
Month	Total Flow (MG)	Avg. Daily Flow (MGD)	Max. Daily Flow (MG)	Min Daily Flow (MG)	Max. Rate (MGD)
January	10.840	.350	1.190	.210	2.5
February	8.240	.294	.680	.230	3.5
March	10.520	.339	.560	.250	1.5
April	14.710	.490	1.010	.280	2.5
May	11.780	.380	.710	.240	1.5
June	8.100	.270	.680	.200	2.0
July	9.370	.302	.420	.220	1.0
August	8.250	.266	.470	.180	5.0
September	7.220	.241	.390	.160	1.0
October	7.316	.236	.320	.170	1.0
November	9.220	.307	.430	.200	1.0
December	8.690	.280	.530	.140	1.0
Total	114.256				
Average	9.521	.313			

COMMENTS

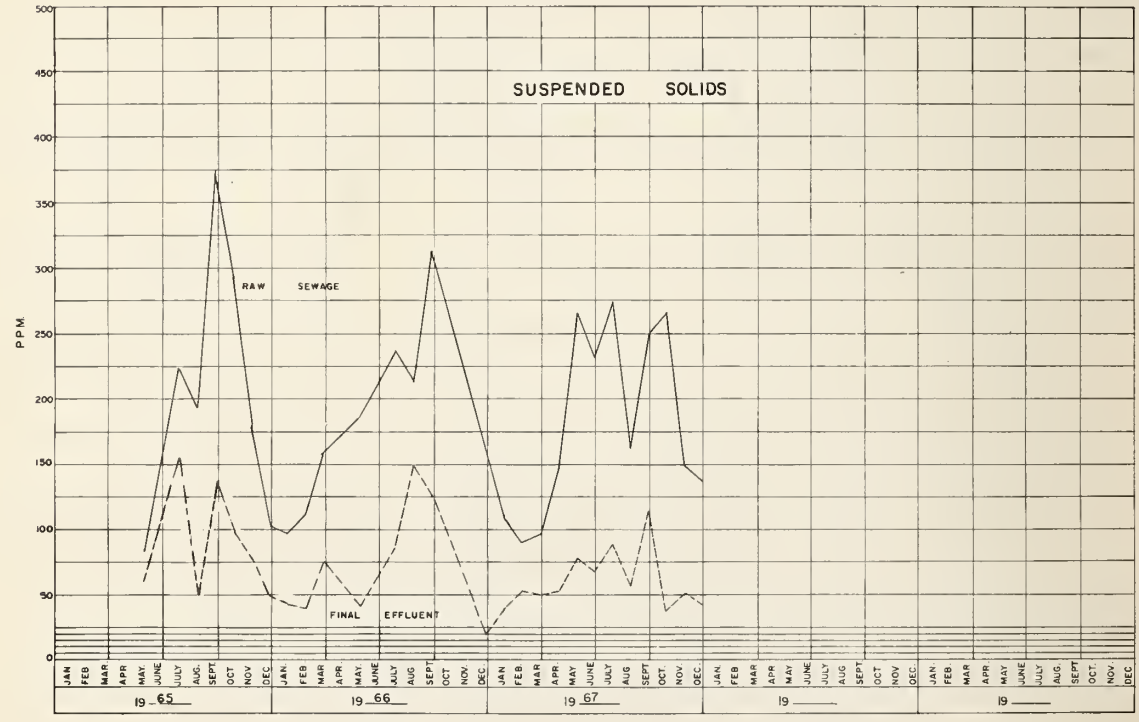
The average daily flow was 0.313 mgd which is approximately 15% of the design capacity. The flows were lower than anticipated in 1967 due to the closing of two local industries. These closings were partially offset by the introduction of other industrial wastes to the system. The design flow was exceeded only 0.05% of the time as determined by the probability graph on page 11.


1967 OPERATING RESULTS
(BOD)
1966 RAW
RAW
SEWAGE
FINAL
EFFLUENT
BOD CONCENTRATIONS (PPM)
'000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10
0.01
0.05
0.1
0.2
0.5
1
2
3
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
% OF SAMPLES EQUAL TO OR GREATER THAN


1967 OPERATING RESULTS
(SUSPENDED SOLIDS)
RAW SEWAGE
1966 RAW
FINAL
EFFLUENT
SS CONCENTRATIONS (PPM)
% OF SAMPLES EQUAL TO OR GREATER THAN
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
10
0.01
0.05
0.1
0.2
0.5
1
2
3
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99



MONTHLY VARIATIONS



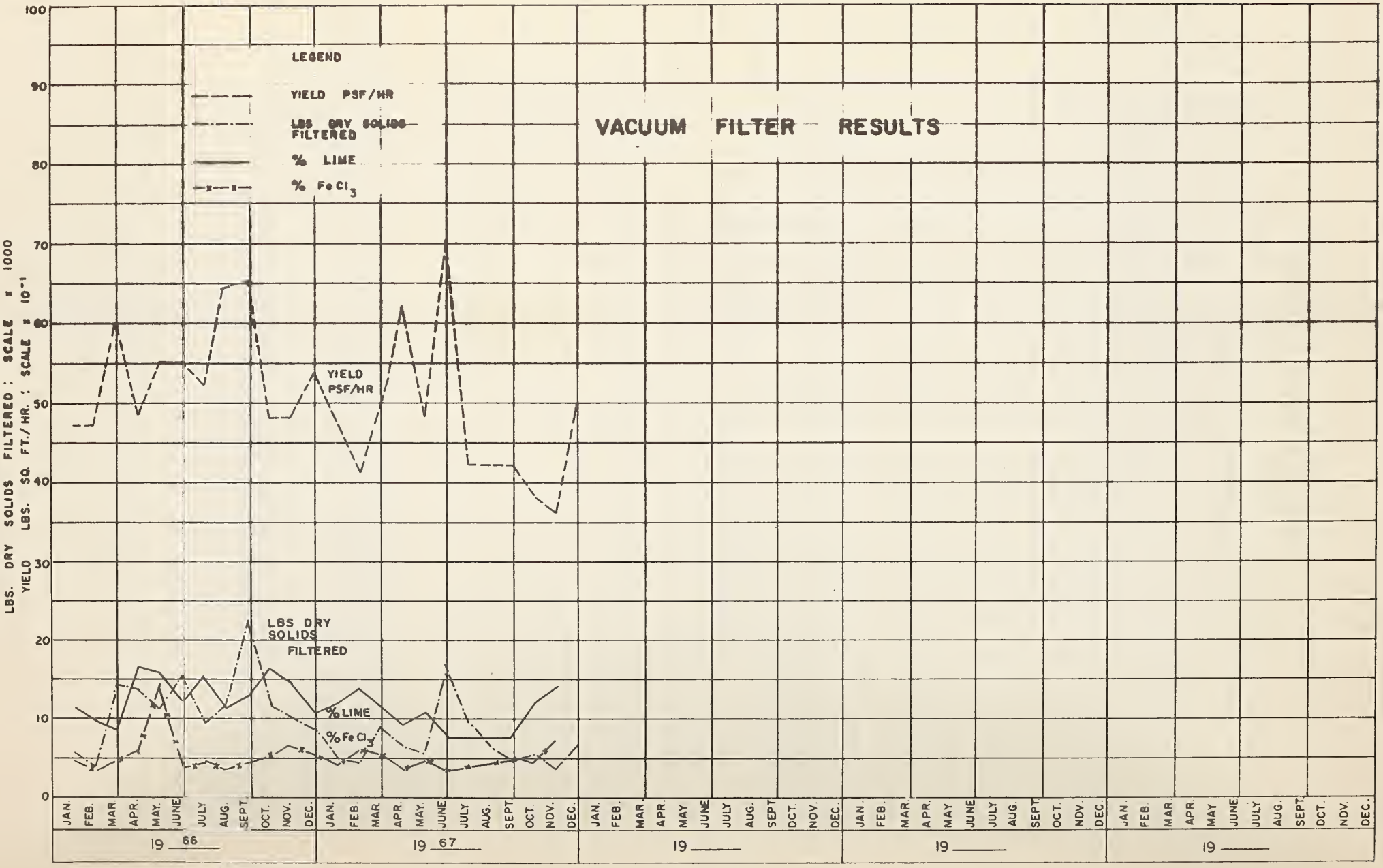
GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	88	37	58.0	2.76	109	37	60.1	3.90	19
FEB.	122	64	47.5	2.39	90	52	42.2	1.56	-
MAR.	120	80	33.3	2.10	96	50	47.9	2.42	20
APR.	107	68	36.4	2.87	147	52	64.6	4.78	10
MAY	109	49	55.0	3.53	266	77	71.1	11.13	30
JUNE	101	57	43.6	1.78	233	67	71.3	6.72	27
JULY	273	112	59.0	7.54	274	88	67.9	8.71	27
AUG.	264	113	57.2	6.23	162	56	65.4	4.37	4
SEPT.	350	263	24.8	3.14	251	113	55.0	4.98	10
OCT.	292	70	76.0	8.12	267	37	86.1	8.41	50
NOV.	181	61	66.3	5.53	150	50	66.7	4.61	27
DEC.	138	41	70.3	4.21	139	41	70.5	4.26	-
TOTAL	-	-	-	50.20	-	-	-	65.85	224
AVG.	179	85	52.3	4.18	182	60	64.1	5.49	19

COMMENTS

The average influent BOD and SS was 179 and 182 ppm respectively while the average effluent BOD and SS was 85 and 60 ppm respectively. The removal efficiency for BOD and SS was 52.3 and 64.1% respectively which is normal for a primary treatment plant.

The grit removed was approximately 1.95 cubic feet per million gallons which although lower than last year, is normal for sanitary sewage.


VACUUM FILTER RESULTS
LEGEND
YIELD PSF/HR
LBS DRY SOLIDS FILTERED
% LIME
% FeCl3
LBS. DRY SOLIDS FILTERED : SCALE = 1000
YIELD LBS. SQ. FT./HR. : SCALE = 10⁻¹
100
90
80
70
60
50
40
30
20
10
0
YIELD PSF/HR
LBS DRY SOLIDS FILTERED
% LIME
% FeCl3
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 66
19 67
19 ____
19 ____
19 ____

VACUUM FILTER OPERATION

MONTH	% SOLIDS FILTRATE	FILTER HOURS	% SOLIDS DIGEST SLUDGE	LBS. DRY SOLIDS FILTERED	LBS. POLY OR LIME (AS CAO)	% LIME (AS CAO)	LBS. $FeCl_3$	% $FeCl_3$	% SOLIDS FILTERED SLUDGE	YIELD PSF/HOUR
JAN.		6.0	5.7	4799	560	11.7	191	4.0	29	
FEB.		5.0	4.8	4114	560	13.6	246	6.0	28	4.1
MAR.	.4	8.5	5.0	8723	980	11.2	464	5.3	31	5.0
APR.	.7	5.0	7.1	6213	560	9.0	218	3.5	28	6.2
MAY.	.5	5.5	5.9	5292	560	10.6	246	4.6	29	4.8
JUNE	.7	11.5	7.3	16161	1260	7.8	519	3.2	31	7.0
JULY	.6	10.5	5.7	9090	* 9.26	*	*	*	27	4.2
AUG.	.7	7.0	6.9	6258	* 7.00	*	*	*	25	-
SEPT.	.7 .7	8.5 2.0	4.8 4.8	1872 2232	* 5.20 175	* 7.8	* 109	* 4.9	28 28	2.7 5.6
OCT.	.8	7.0	7.1	5325	630	11.8	245	4.6	27	3.8
NOV.	- 1.0	2.3 2.5	5.4 5.4	1685 1735	* 5.00 245	* 14.0	* 123	* 7.0	24 26	3.7 3.5
DEC.	0.6	6.0	7.7	6152	* 9.00	*	*	*	25	5.1
TOTAL	-	82.3	-	79671	5530	-	2361	-	-	-
AVG.	0.7	6.9	6.1	6639	691	10.1	295	4.3	28	4.8

* POLYELECTROLYTE USED IN LIEU OF CAO AND $FeCl_3$
TOTAL QUANTITY POLYELECTROLYTE = 35.46 LBS.
AS % DRY SOLIDS = 0.0014

COMMENTS

During 1967, two methods of sludge filtration were employed. Conventional chemicals were used to filter a total of 27.26 tons of dry solids and polyelectrolytes were used to filter an additional 12.58 tons.

The average yield of 4.8 pounds of dry sludge per square foot is considered to be normal for this type of operation. The chemical requirements of the sludge; lime at 10.1% and ferric chloride at 4.3%, were slightly higher than normal; however, this can be attributed to the unusual characteristics of this sludge.

A total of 35.46 pounds of polyelectrolyte were required to filter 12.58 tons. If lime and ferric chloride had been used, an additional 2550 pounds of lime and 1080 pounds of ferric chloride would have been required.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	10.840	-	-
FEBRUARY	8.240	25 (1)	0.85
MARCH	10.520	68 (4)	5.01
APRIL	14.710	648 (22)	6.01
MAY	11.780	858	7.28
JUNE	8.100	580	7.16
JULY	9.370	939	10.02
AUGUST	8.250	901	10.92
SEPTEMBER	7.220	786	10.88
OCTOBER	7.316	758 (30)	10.70
NOVEMBER	9.220	-	-
DECEMBER	8.690	-	-
TOTAL	114.256	5563	-
AVERAGE	9.521	795	8.60

( ) Brackets indicate days of operation.

COMMENTS

Disinfection of the final effluent by the use of chlorine is practiced April through October in order to avoid any danger to public health from recreational use. A combined chlorine residual of 0.5 ppm after a 15 minute contact period is maintained.

The total 1967 use was reduced considerably due to the decreased BOD loadings and flows.

CONCLUSIONS

During 1967, the Port Dover plant produced an effluent that met or exceeded the design expectations for a primary plant however, the effluent did not meet the OWRC objectives for 15 ppm for BOD and suspended solids at all times.

Experimentation with polyelectrolytes for vacuum sludge filtration produced favourable results with a substantial reduction in the unit cost. Further savings will also result in the cost of hauling the sludge for disposal due to the reduction in volume and weight by the amount of lime and ferric chloride formerly used.


ONTARIO WATER RESOURCES COMMISSION